SCANCENTER BEARING

& Belt Monitoring System

MANUAL AND INSTALLATION GUIDE

READ THIS ENTIRE GUIDE BEFORE PROCEEDING WITH THE INSTALLATION

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www.rolfes.com ♦ Revision II, Winter 2002

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1.0 Introduction

Thank you for purchasing the Rolfes Company's ***SCANCENTER BEARING*** & Belt Monitoring System. The ***SCANCENTER*** *Series* utilizes electronic switching which makes it the fastest and most repetitive system on the market for monitoring bearing temperatures and belt alignment.

The Rolfes Company offers a comprehensive line of monitoring equipment. Our complete product range and extensive systems experience allows us to offer effective solutions to a wide spectrum of your practical requirements. Our extensive background in systems monitoring along with a constant program of innovation and technological development, allows us to offer cost-effective and user-orientated solutions.

This manual is presented as a reference for the installation and operation of this system. Please read **all** instructions for this and any other system prior to installation to better understand its operation.

NOTE: The Rolfes Company will not be responsible for damages caused by any hardware or equipment, which has not been supplied by The Rolfes Company.

If you need assistance with any item in this manual, please write, FAX or call :

800-824-7274	***Toll Free***	***Customer Service***	***Ext. 120***
319-392-4194	***International***	***Service Department***	***Ext. 121***
319-392-4192	***FAX***	***Sales Department***	***Ext. 141***

2.0 Overview

The Rolfes Company offers the next generation in hazard monitoring systems with the ***SCANCENTER BEARING*** & Belt Monitoring System. It has the capability to continuously monitor your facility and notify any person when a problem arises via an audible alarm, display, printer and/or computer screen.

The ***SCANCENTER*** uses type "T" thermocouples and is designed as a preventive maintenance system to monitor the bearings and belt alignment in your facility. It can save costly equipment repairs by detecting a problem at the earliest stages. It can also help save downtime, by allowing you to schedule a repair before a large amount of damage occurs. Catastrophic damage from spark/heat-ignited explosions can be prevented.

The ***SCANCENTER*** System connects to the Rolfes Company's solid state Multiplexers (MUX) via an RS-485 multi-drop communications cable. Each MUX consists of a Smart Card, a group of MUX cards (switches), a power supply card and several pigtail connectors. The MUXs' pigtails are connected to temperature sensing thermocouples located at various points around the facility. The T/C's generate a voltage proportional to temperature, which is converted to a digital value by the Smart Card in the MUX. Each MUX is assigned a communications address which is set by switches on the Smart Card. The ***SCANCENTER*** can quickly retrieve the temperature of any T/C on any MUX in the system.

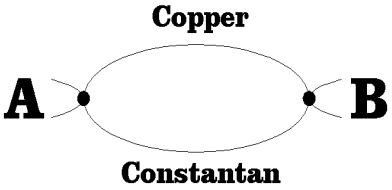
The ***SCANCENTER*** can display the temperature of an individual sensor for diagnostic purposes or it may continuously scan the temperatures of each sensor and compare it against pre-determined set points and sound an alarm, print a report of the time and temperature or inform a PLC of an alarm condition on a piece of equipment.

The ***SCANCENTER*** has 10 groups of set points, which may be monitored. Each group contains a warning and an alarm value. Each sensor of each MUX is assigned to one of the 10-warning/alarm groups. The ***SCANCENTER*** also has an equipment number assigned to each MUX. If sensor is not available for some hardware reason, such as no sensor connection, the equipment number should be set to zero. A value between 0 and 63 can be assigned to each operative sensor. When the ***SCANCENTER*** is in Auto Scan Mode, this equipment number will be sent to the PLC interface along with a bit to indicate warning or an alarm when the temperature of any sensor assigned to that piece of equipment is above the set points. An audible alarm is connected to alert the operator of warning and alarm conditions, which may require attention.

2.1 SCANCENTER BEARING Series Features

- User Programmable
- Immediate Temperature Retrieval
- Centralized Control Center Monitoring with Remote Computer Capability
- RS-485 Multi-drop Serial Port Communication to Multiplexers
- RS-232 Serial Communication Port for Printer or Computer Log
- Remote Alarm Relay
- PLC Interface Capability
- Self-Diagnostics – Continually scans for communication & sensor errors.
- Building Block Approach for Easy Expansion
- Centigrade / Fahrenheit Capability
- Optional 240 Volt Operation

3.0 Thermocouple Theory



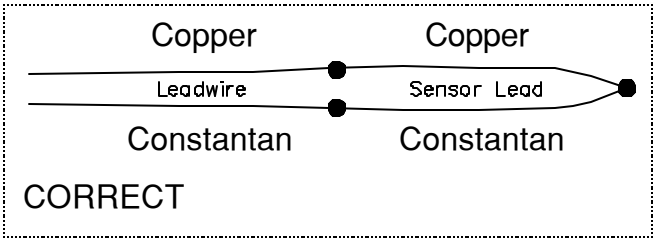
Many different metals are used for a thermocouple in various applications: however, copper and constantan are the most practical for temperatures below 600 F°. A constantan is an alloy, approximately 57% copper and 43% nickel. The junction of copper and constantan is called a Type "T" Thermocouple. When a circuit is formed consisting of two dissimilar conductors and one of the formed junctions of these two conductors (A) is a temperature higher than the temperature of the other junction (B), a minute voltage is generated and a current will flow in the circuit.

The current will flow in one direction if the temperature at (A) is higher then (B). The current will flow in the opposite direction if the temperature at (B) is higher then (A). No voltage will exist and no current will flow when the temperature of junctions' (A) and (B) are the same. A single junction, such as (A) or (B) is commonly called a thermocouple. The common abbreviation for thermocouple is T/C'S. Any mix of type "T" thermocouple sensors, (probe, surface mount or rub block style) can be used with the *Scancenter LX Series Instrument*.

3.1 Proper Wiring

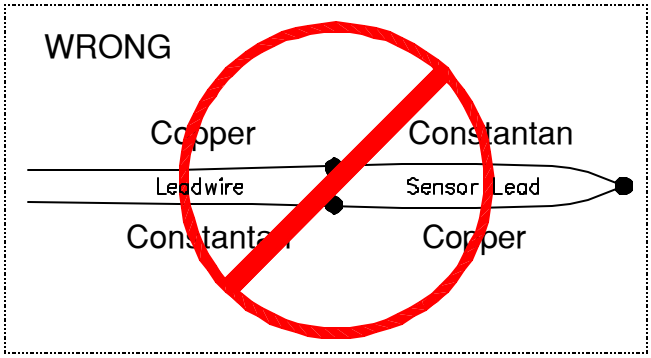
Wiring type "T" thermocouples is a relatively easy task, provided you understand how it works. As explained earlier, there are two different metals in a junction: one copper and another being the alloy called a constantan. With this in mind every sensor must have 1 copper and 1 wire that is common (constantan) to all sensors.

Connecting the nickel-plated constantan to a copper creates a thermocouple. However, if a wrong connection is made (lower example), you are actually making three T/C's. This will cause the temperatures read backwards. That is, if the bearing you are monitoring gets hot the instrument will see the temperature go cold **or** when you do a freeze mist test the temps will go hot.



🗣 VERY Important!! Do NOT use any other wire than what is supplied; you WILL have problems by doing so.

Another factor here is to keep in mind that the wire types must stay consistent throughout the system. From the sensor back to the instrument will be two wires, the nickel-plated constantan and a copper. If either of these wires are crossed, you will have problems (see right). Or, if you use anything but the supplied wire you may also have problems.



3.0 Bearing Temperature Systems And Their Uses

The original mandate by O.S.H.A. to monitor internal bearings and belt alignment in certain facilities sent everyone into a panic mode to purchase and install the equipment to avoid any fines. After the equipment was installed and an alarm notified the operators of a bearing that was overheating, everyone started to recognize the cost savings of equipment repair and the safety factor involved. As a result, an increasing amount of bearing monitoring equipment is sold as an add-on to an existing system along with an upgrade to a faster, more repetitive system.

3.1 Temperature Serial PLC Interface

The Temperature Serial PLC Interface Software is for all of those hazard monitoring systems where the customer wants to use their own computer or PLC programming and interface into our temperature systems in one way or another. Some want to interface bearings to a PLC to a PC running their software and some may be using some other kind of computer to do their main control work and wish to interface to our equipment but do not wish to or cannot use our PC-BASED software.

Instead of connecting the ***SCANCENTER*** RS-232 port to a printer or to a PC running our software, it can be available for connection to the customer's equipment. When the ***SCANCENTER*** is in Auto Mode, the RS-232 output will provide a continuous ASCII data stream consisting of MUX #, Sensor # and temperature for that point followed by a carriage return and line feed.

The Temperature Serial PLC Interface Software is based on the bearing printer program. The number of MUX's and the number of Sensors in each MUX will be stored in the ***SCANCENTER'S*** battery backed ram and will be programmed via the front panel keypad in the same way as the bearing printer ***SCANCENTER*** program.

3.2 Bearing Scancenter PLC Interface

The PLC Interface box is connected to the 15-pin port on the rear of the ***SCANCENTER***. The PLC Interface box provides eight (8) Form C relay contacts. As a fail-safe protection, the relays are normally energized and are turned off to communicate with the PLC. One set of contacts is for an alarm bit, one set of contacts is for warning and the remaining six (6) are used to denote a binary number "equipment" number. The sensors in the system are assigned to one of 63 "equipment" numbers.

Equipment numbers are assigned via "power-on" sequence. Assigning a piece of equipment to a number from 0-63 to each MUX and Sensor (similar to assigning groups to sensors). If a Sensor is assigned to equipment number zero (0), the program assumes the Sensor is not wired or is to be excluded from scanning for some hardware reason. Sensors assigned to equipment number (0) will show as disabled in a group number input, and in manual, and will show N/A on the configuration printout.

3.3 Printer Option

The reports provided by the ***SCANCENTER*** require an Epson compatible serial printer to be connected to the RS-232 port. The ***SCANCENTER*** will send the data to the printer via the RS-232 port at 2400 Baud with setting of 8 data bits, No parity and 1 Stop bit. The ***SCANCENTER*** respects XON-XOFF flow control to ensure the printer can process the data it sends without loosing data but will timeout to prevent a jammed printer from causing the ***SCANCENTER*** to cease scanning temperatures. Most of the reports require the printer to switch to 12 characters per inch for proper formatting.

4.0 SCANCENTER BEARING Components

Equipment Descriptions

The ***SCANCENTER*** Console can be used as a stand-alone unit with / without a printer or if connected to a computer or PLC. Modular design ensures quick scan time, regardless of the number of points being monitored. Capable of monitoring over 3,000 thermocouples.

The ***SCANCENTER*** consists of a LCD display, keypad and all internal electronics and software. The keypad allows the user to program certain features and view temperatures immediately.

4.1 Specifications:

Size	10" X 10.5" X 4"
Weight	8 Lbs. (Shipping Wt.)
Enclosure	18 Ga. Steel - Painted
Alarm Output MAX Rated	115 Volts (+10/-15%), 1 Amp
	50/60 Hz, 50 Watts Max.
Display	80 Characters (2 Lines, 40 Each)
Serial Link	Bi-directional, 25-pin sub D Connector
Physical Connection of Link	RS-485 Multi-drop, 9-pin sub D Connector
Isolation	2500 Volts AC
Data Link Format	IBM SDLC
Transmission Speed	62.5K BAUD
Max. Number Multiplexers	10
Max. Distance W/O Repeater	1,000 ft.
Auto Scroll Update Time	4 Seconds
Computer	RS232-9600 BAUD
Printer Interface	RS232-2400 BAUD
PLC	RS232-19200 BAUD
Operating Temperature Range	32°F to 140°F
Humidity	Maximum 95% non-condensing

4.2 Multiplexers 7/16

There are two sizes available, a MUX 7 can hold a maximum of 147 sensors, and a MUX 16 can hold a maximum of 336 sensors. The Multiplexers are typically centrally located in the facility to reduce the amount of sensor leadwire necessary for a system. The electronic cards are housed in a NEMA 4 type enclosure and can be located in a hazardous area when connected to an intrinsically safe power supply. The purpose of the Multiplexers is to select one individual Thermocouple (T/C), out of 336 maximum available (see specifications), read the temperature, verify it, convert it to digital signal, and transmit that signal to the ***SCANCENTER***.

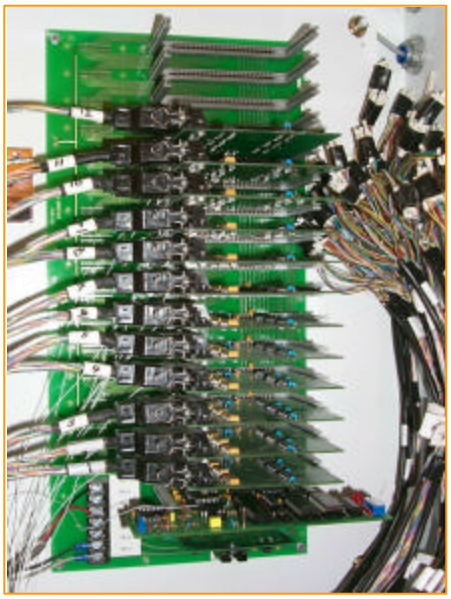
To accomplish all of these functions, the MUX's consist of 5 Major Components.

- Multiplexer Rack (backplane) - consists of guides to hold electronic cards in place, and the terminal block for wire terminations.
- Communication Card (Smart Card) - This is a "T" shaped card, which reads the thermocouples and transmits the signal to the ***SCANCENTER***.
- Power Supply Card - Converts 12 Volts DC to divide in to +5VDC and -5VDC.
- MUX Card - Performs switching of 21 Thermocouples down to one.
- MUX Pigtail - Allows connection of field wiring (up to 21 Thermocouples) to the Multiplexer Rack.

4.2.1 Specifications:

	MUX 7	MUX 16
MUX Card connectors	7	16
Enclosures	Hoffman A-201608LP	Hoffman A-242008LP
	NEMA, Type 12	NEMA, Type 12
Dimensions	20" X 16" X 8"	24" X 20" X 8"
Paint Finish	Powder Coated - Grey	Powder Coated - Grey
Door Clearance Minimum		
Front Side	16.00"	16.00"
Right Side	1.00"	1.00"

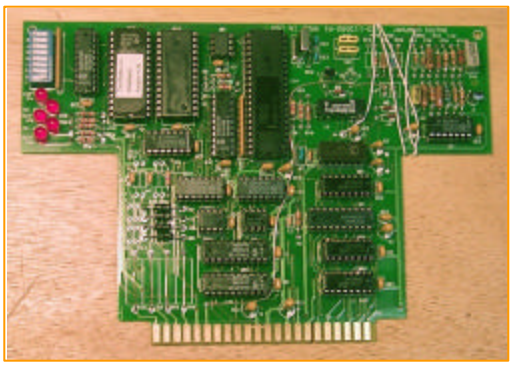
MUX-7



MUX-16

4.3 Smart Card

The *Smart Card* is a "T" shaped card that has a 8 position "DIP" switch for addressing each MUX (see MUX Identification) along with 5 red LED's. The following is the status of each when power is applied.



LED 1	TXD	Blinks when transmitting data
LED 2	RXD	Can be on, off, or blinking
LED 3	RUN	Constantly Blinks
LED 4	+5V	Constantly ON
LED 5	-5V	Constantly ON

4.3.1 Specifications:

Size	7.50" X 5.00"
Weight	4 Ounces
Connector	Edge Card with Gold Plating
Analog Signal Input	22.5 uV/°F from type "T" Thermocouple
Compensation	Cold Junction Reference
Digital I/O	Inputs are buffered via an Optical Isolator
Output Communications	RS-485 Multidrop
Data Format	IBM SDLC
Transmission Speed	62.5 K BAUD

4.3.2 MUX Identification

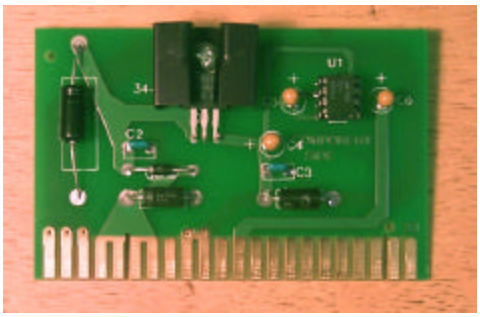
The MUX identification is accomplished by setting the DIP switches on the Smart Card to the number of MUXs in the system.

	1	2	3	4	5	6	7	8
MUX 1	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 2	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 3	**ON**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 4	**OFF**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 5	**ON**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 6	**OFF**	**ON**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 7	**ON**	**ON**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 8	**OFF**	**OFF**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 9	**ON**	**OFF**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**
MUX 10	**OFF**	**ON**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**

4.4 Power Supply Card

4.4.1 Specifications:

Size	4.60” X 2.30”
Weight	1.2 Ounces
Connector	Edge Card with Gold Plating
Input Power	+12 VDC 180 mA
Output Power	+5 VDC 200 mA
	- 5 VDC 20 mA
Regulation	+/- .5% Maximum



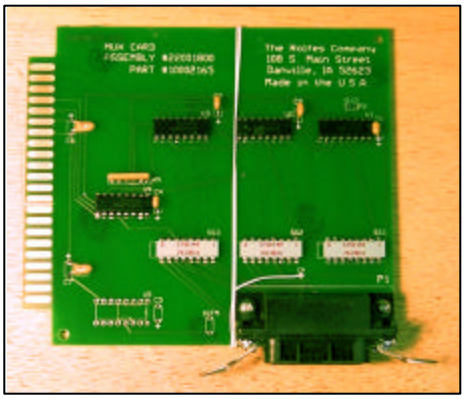
Power Card

4.5 MUX Card

The MUX Cards contain Solid State CMOS switches and fault limiting resistors. Each card can handle up to 21 thermocouples.

4.5.1 Specifications:

Size	4.50” X 3.00”
Weight	1.5 Ounces
Connector	Edge Card with Gold Plating
Input Power	+5 VDC 1 mA
Analog Input Signal	22.5 uA V/°F from type “T” Thermocouple
Switching Type	Solid State
Input Protection	RC Network



MUX Card

4.6 MUX Pigtail

The MUX Pigtails provide the connection of the field wiring to the motherboard. There will be one pigtail per MUX Card. The pigtail consists of a 24-pin connector with 4’ of jack leadwire.

4.6.1 Specifications:

Connector	Amp
	24-Pin Gold Plated
Jack Leadwire	3 groups of 7 wires
	Polypropylene Insulation on individual wires
	PVC Outer Jacket

4.7 Remote Power Supply

The remote power supply is a UL Approved intrinsically safe apparatus. The outputs are rated for use in Class I, Group D, Class II, Groups E, F and G hazardous locations. Connecting the remote Multiplexers to this power supply, allows them to be located in a hazardous area. The power supply converts 120 VAC in (240 VAC Optional) to a 4-Channel 12 VDC output. Power supply must be within 200 feet of the Multiplexer. One power supply can operate up to four remote Multiplexers. The power supply is a NEMA 12 type enclosure and must be located in a non-hazardous environment.

🏷 *NOTE:* A licensed electrician must perform all electrical connections.

4.7.1 Specifications:

AC Input	120/240 VAC 50/60 Hz
AC Input Current	.6A at 120 Volts; 3A at 240 Volts
DC Output	4 Individual Outputs
Entity Parameters ea. Output	Voc = 13.70 VDC
	Ca = 73.46 yF
	Isc = 1.45 A
	La = .6mH
Max Distance to MUX	200’ (Using 18 AWG wire)
Enclosure	Hoffman A-1210 CHNF NEMA Type 12
Physical Size	13.50” X 11.00” X 5.50”
Weight	10 Pounds

4.7.2 Remote Power Supply Cable

Two conductor, stranded 18AWG, shielded cable (with a strain member) is normally used to connect the remote power supply to the remote Multiplexers.

4.8 Remote Alarm & Siren

ALRM-100

An optional remote alarm can be purchased. It consists of a fused power supply box with test button and a siren. The power supply box is powered by 120 VAC. The siren alarms when the relay contacts on the back of the ***SCANCENTER*** closes. It is connected by two conductor, 22 AWG wire.

4.8.1 Specifications:

Enclosure	Hoffman A606
Physical Size	6.50” X 7.50” X 4.25”
Ac Input	120 VAC, 60 Hz 18 W
Output	12 VDC, 500 mA
Fuse	¼ Amp

4.8.2 Dual Tone Siren

Siren Type	SPECO Dual Tone Siren
Size	5” X 8”
Case	Weatherproof
Tone(s)	Dual – Whirl / Solid
Operating Voltage Range	6-12 VDC
Current	220 mA at 12 V
Sound Level	120 dB at 12 V (30W)
Alarm Wire	2 - 22 AWG
Outer Jacket Type	PVC
Nominal OD	.156

Siren

4.9 Communications Cable

Cat V twisted pair cable is used to connect the ***SCANCENTER*** to the remote Multiplexers.

4.9.1 Specifications:

Number of Conductors	2 Twisted Pair (4)
Size	26 AWG
Weight	.027 lbs. / foot
Insulation Type	PVC
Outer Jacket Type	PVC
Nominal OD	.238”

4.10 Recommend Equipment:

Electro or EMP style crimpers are recommended when using the supplied SPL-10 crimps to aid in making all splices or connections.

4.10.1 Using Type "B" - SPL-10 Crimps:

The Rolfes Company *HIGHLY* recommends using the Electro or GMP style crimpers with type "B" crimps when making leadwire or thermocouple splices.

By using this style of crimper, the installer can accomplish proper splices without having to strip each individual wire. Each crimp can accommodate 3 - 24 AWG un-stripped wires. Only in certain circumstances (when more than 3 wires or larger gauge wires are used) will it be necessary to strip back wires. This type of splicing tool allows the installer a more efficient way to make all splices in the system.

Each crimp has several "teeth" on the inside of it. These "teeth" grip each wire through its insulation. Since these crimps are designed for 3 - 24 AWG un-stripped wires, if more than the designed amount of wire is inserted into the crimp the "teeth" will not be able to penetrate the insulation of each wire.

When the crimper is used it will save the installer time and any headaches from stripping each wire.

🏷 *NOTE:* This tool is adjustable; please call for proper size shims for the style of crimp you are using.

4.11 Electrical Connections

The ***SCANCENTER*** has been set to your voltage specification at the factory, either 120 VAC or 240 VAC. Please contact your representative if this incorrect. Rolfes is not responsible for installing the wrong voltage to the ***SCANCENTER***.

5.0 System Installation

Now that you have become familiar with the components of the system, there are four things that MUST be done prior to performing any labor. The ***SCANCENTER*** instrument is vital piece of equipment for the safety and smooth operation of your facility. Please use good judgment when choosing an installer.

5.1 Decide On The Location Of The Following Equipment

1. The ***SCANCENTER*** must be located in a non-hazardous area. It's typically located in a scale room or office. It should be located so that anyone in the facility has easy access to it.
2. *Remote Multiplexers* should be centrally located to reduce the amount of leadwire required to connect to the Multiplexer. Also located so that service personnel have easy access to it.
   a. The remote Multiplexer can be installed in a hazardous location, ONLY WHEN it is connected to intrinsically safe power supply.

🏷 *NOTE: Keep in mind the location of the remote power supply when considering the location of the Multiplexer*.

3. *Remote Power Supply* must be located in a non-hazardous area. The power supply operates on 120 VAC and must be connected by a licensed electrician. When possible, it should be connected to a dedicated 15 or 20 Amp circuit. The maximum distance allowed between a single remote Multiplexer and the power supply, is 200'. It is typically located in an MCC room.
4. The *Remote Alarm* is highly recommended on a bearing installation. Neither the siren or power supply can be located in a hazardous area. The siren can be located in an outside environment; however, it should be protected from the elements.

5.2 Inventory & Sensor Layout

Make list of all equipment that will be monitored and inventory the monitoring system. This information may be outlined on your quotation prior to the purchase of this system.

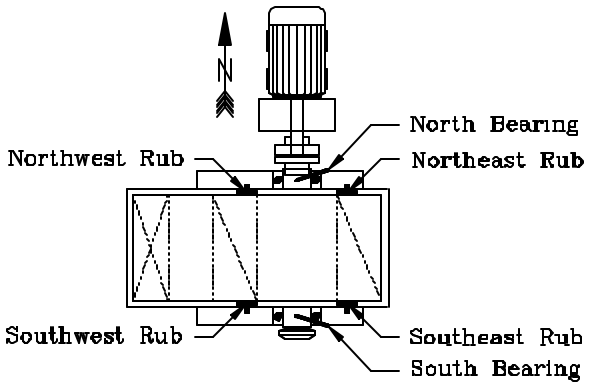
Prior to wiring the sensors, its highly recommended making an overhead drawing showing the location of the equipment being monitored and location of the ***SCANCENTER*** System components. This will serve a means of keeping track of sensors installed and to ensure nothing is over looked along with being very beneficial when it comes time to lay out conduit and wire required to connect the components together.

For example: If you were to start on the head section of "leg #1" use the north or the motor side main bearing as the first sensor in the system. Followed in a clockwise manner by the northeast belt rub, southeast rub, etc. (see diagram following page) for every leg and belt in the system. Continue this at the tail (or boot) of the leg. Use the wire color code (see leadwire diagram) to keep splices consistent between each leg and / or belt. By doing this it's much easier to wire and if need be, to troubleshoot.

🗣 *HINT:* If the installer works on one piece of equipment at a time and installs the sensors in a logical manner, any wire troubleshooting will be much easier to find.

6.0 Mounting Sensors

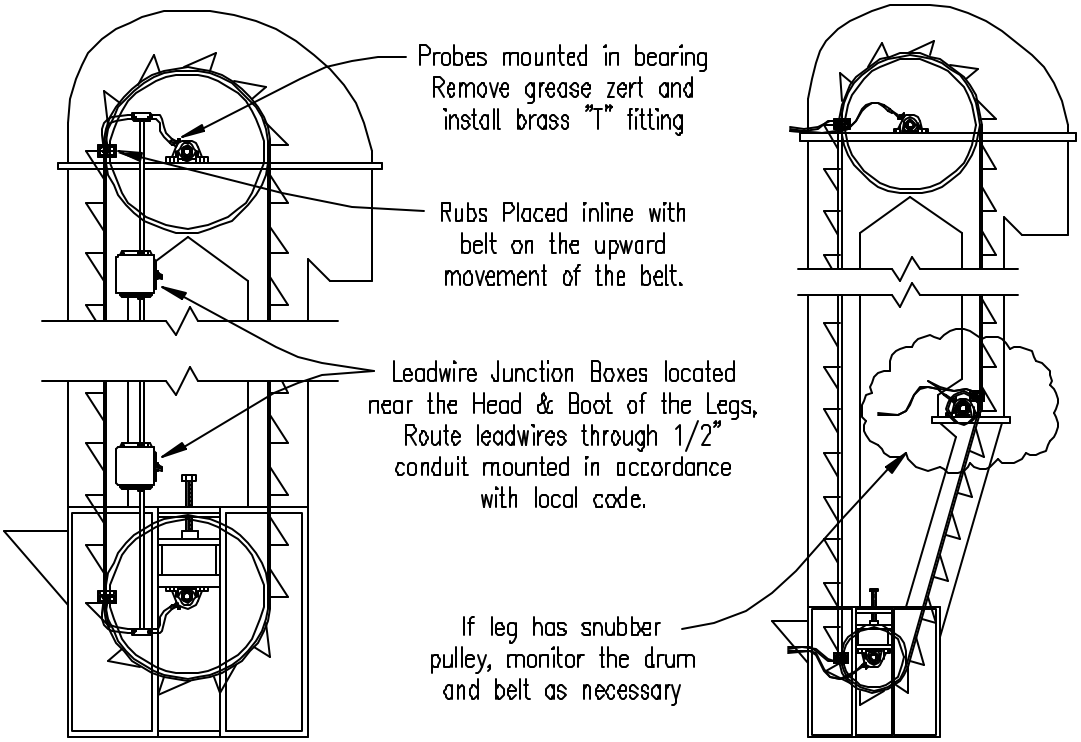
Installing the sensors requires a knowledgeable & skillful contractor. It's recommended that Rolfes personnel be contracted to do this work, since it may save the customer any headaches associated with an installer who is not resourced with the knowledge and/or skill to install hazard monitoring systems.



6.1 Installation – Leg Rub Points

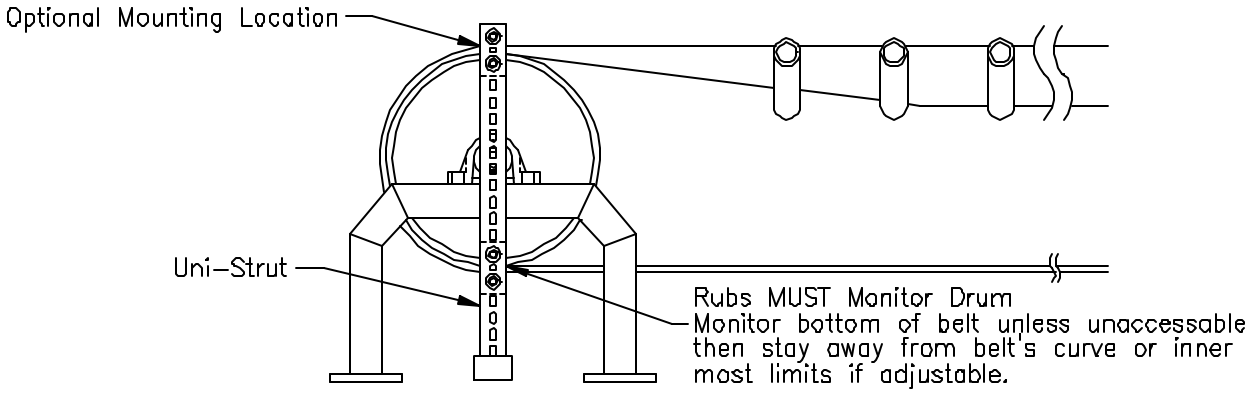
The rub point sensor is used to monitor pulley and belt alignment in product (e.g. grain) moving equipment. With these rubs in the proper location they will save the owner / operator from excessive down time due to any mishaps from alignment problems. With this in mind, mount each rub point as close as possible to the pulley, normally ½" to an 1" from the head, knee, or tail in a secure manner. At the tail section, the rub sensor is to be mounted with adequate room for pulley adjustment. The rub should **NOT** touch or interfere with the pulley.

For rub point sensors mounted on grain legs, a minimum of four rubs should monitor the upward moving portion of the belt (e.g. two rubs at the tail along with two rubs at the head on both sides of the upward moving belt of the leg). If the leg being monitored has a "Knee" or "Snubber" pulley, two more rubs should be installed so that it monitors this location as well (see below).

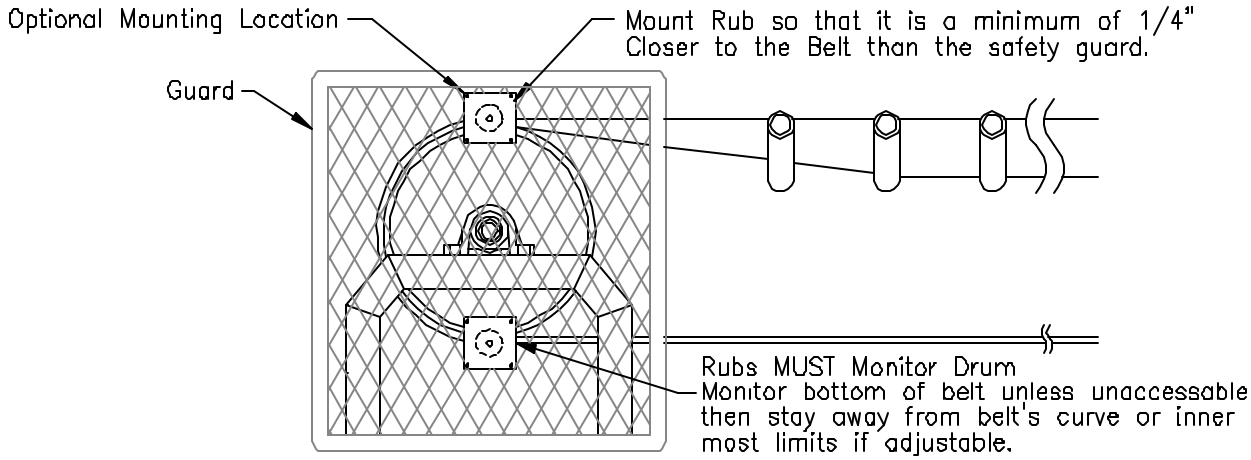


6.2 Installation – Belt Rub Points

Rub point sensors that monitor open or enclosed belts; these should be mounted in a manner to monitor the bottom side of that belt. Mount each rub point as close as possible to the pulley, normally ½" to an 1" from the head, idler, or tail in a secure manner. At the tail section, the rub sensor should be mounted with adequate room for pulley adjustment. The rub should **NOT** touch or interfere with the pulley (see below).



Open Conveyor Belt



Enclosed Conveyor Belt

7.0 Cutting & Drilling for Rubs

> 🗣 *Warning: Follow ALL safety precautions and LOCK-OUT / TAG-OUT the equipment that is being worked on.*

Prior to mounting the rub sensors, determine the pulley diameter. This will help to locate the belt with little effort if there are no access doors, etc. The accuracy of locating correct sensor position is crucial to this system.

Once the belt is located mark and drill a pilot hole to ensure the sensor's center will monitor the belt and pulley if required. Check the position by placing a heavy gauge wire through hole and "feeling" for belt. If the belt is located directly beneath this hole, then you're ready to start cutting the sensor hole. This requires a good quality hole-saw, cutting fluid and a heavy-duty low speed drill. The hole must be drilled slowly with adequate cutting fluid applied by dribbling down the metal onto the hole-saw as the hole is cut.

🏷 *NOTE:* If the drill runs to fast, the teeth will not bite in and will wear quickly. Cutting fluid will eliminate excessive heating of the tool and any sparks produced.

Use an appropriate size hole saw, drill into the pilot hole that located the belt. Once the hole is made the sensor should be checked for proper fit. If the hole is too small it may be reamed to size. Place the rub assembly in the drilled hole and mark the 4 retaining holes. Drill through the equipment's wall using a slightly larger bit than the mounting holes.

> 🗣 *RECOMMENDED: After all drilling and cutting is completed, the use of a rust inhibitor or good quality paint is recommended to prevent any corrosion to the equipment.*

*7.1 **RPS-2** / 2" Rub Blocks*

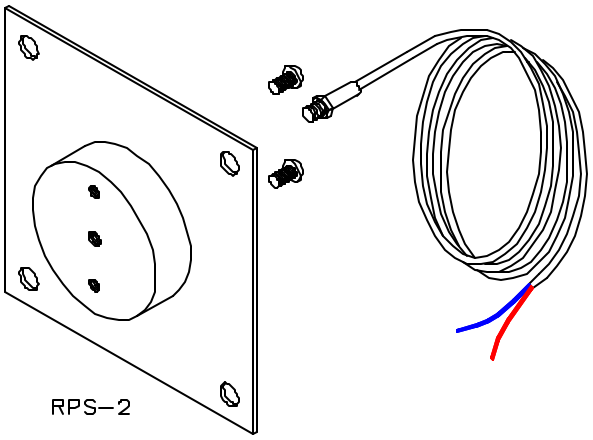
Determine location of the sensor. See ***CUTTING & DRILLING*** for use as a guide**.**

- Use a 2-1/8" hole saw and cut into the leg casing, in line with the belt and/or pulley. Verify your measurement prior to drilling.
- Insert the rub block into the hole and mark the four corner holes of the plate, then remove the rub block.
- Use appropriate drill bit, drill out the four mounting holes.
- Re-insert the rub block and attach it with appropriate hardware.
- Screw the drill and tap sensor into the rub block.

*7.2 **RPS-4** / 2" X 4" Rub Block*

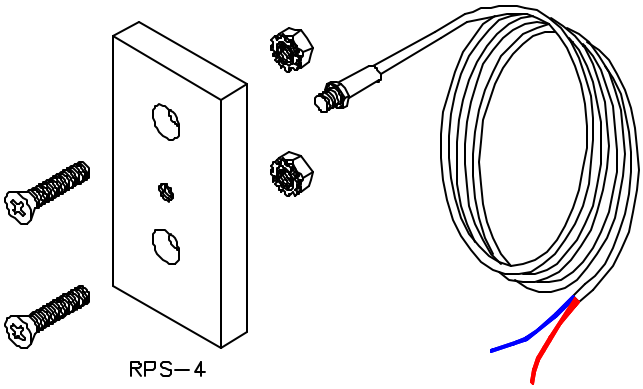
On an open conveyor, a 2" X 4" rub block is commonly used. These can be installed several different ways.

- The most common is to attach the rub block to a floor mounted or otherwise secured section of Uni-Strut.
- Screw the DTS sensor into the back of the rub block and mount it to the Uni-Strut in a secured fashion.



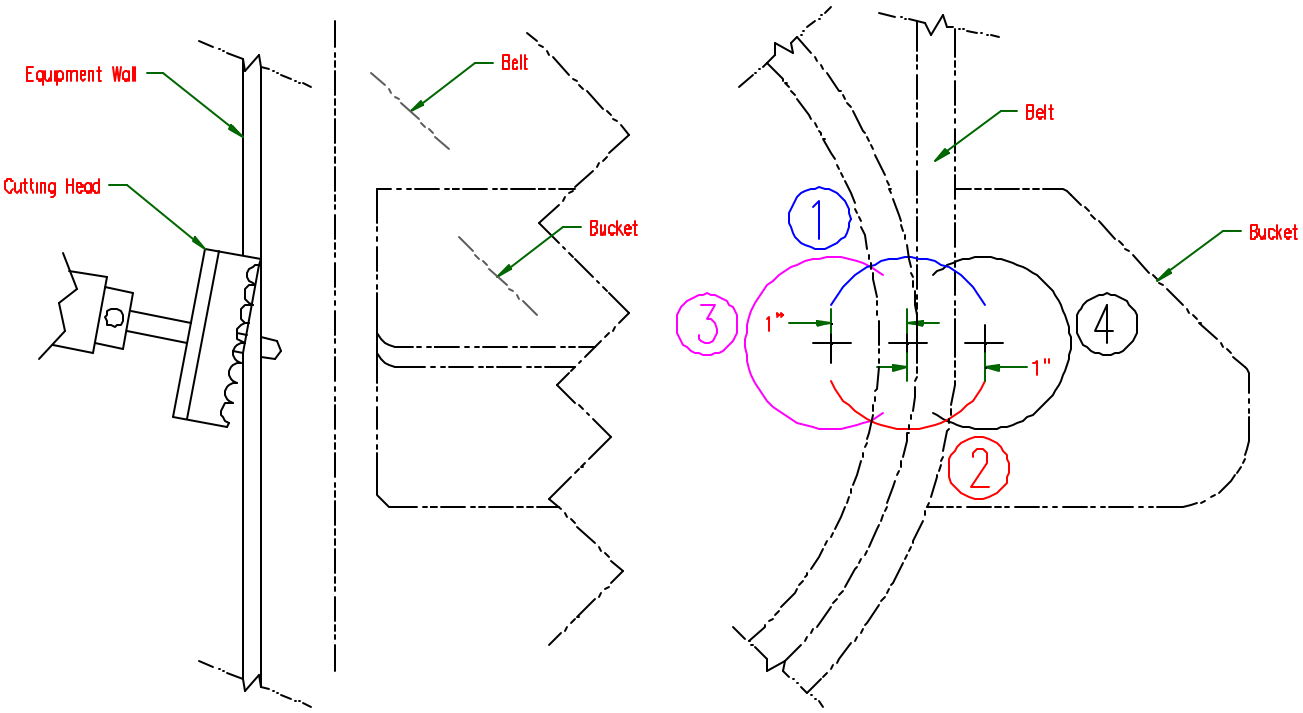
RPS-2

RPS-4



7.3 RPS-8 / 2" X 4" Rub Block With Conduit Fitting

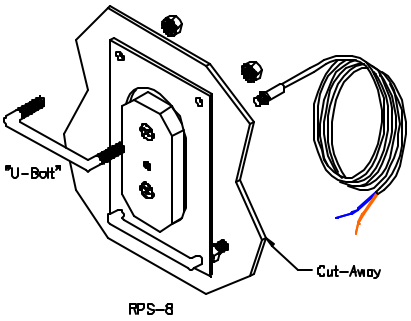
Determine location of sensor. See *Cutting & Drilling.*



RPS-8 Cutting Procedure

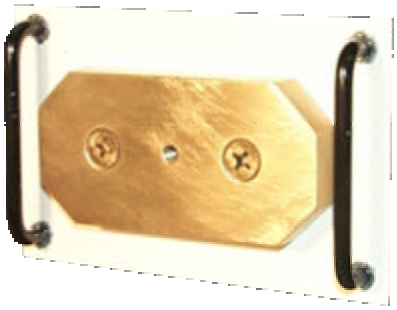
For the RPS-8 rub, use the example above.

- Start by drilling into the casing at an angle and cut along line 1, but not the circumference of the cutting blade.
- Next cut along line 2, again not the circumference of the blade.
- Measure 1" perpendicular to the belt from first hole an drill into line 3 with more cutting area.
- Next, place a piece of wire into the hole of the 3rd cut (this will help to retain the piece of metal so it doesn't fall into the equipment).
- Finally drill the last line (#4) and remove the remaining material.



The bolts are inserted from the inside out through the sensor's hole. **Be very careful not to drop any bolts inside the equipment.** Mount the rub sensor on the bolts and secure in place. It may be necessary to shim the sensor out from the equipment wall, this can be done by placing shaped UHMW or washers on the outside portion of the bolts and then mounting the rub sensor.

If required, install "Seal-Tight" from RPS-8 sensor to a junction box and wire according to the examples in this guide.



RPS-8

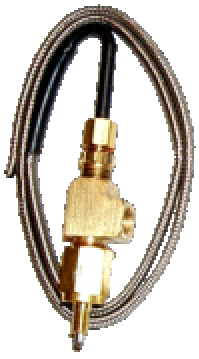
8.0 Bearing Probes

Depending on the type of bearing that will be monitored, no modifications should be necessary. Only in certain circumstances will this be necessary and recommended that the manufacturer of the bearing be contacted prior to any modifications or drilling.

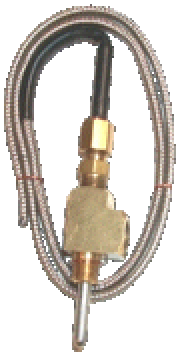
> *NOTE: The Rolfes Company is not responsible for any damage incurred from the installation. Use good judgment to prevent any damage in the installation process.*

- Clean the area around the grease zerk to avoid foreign matter from entering the bearing during the probe installation.
- Remove the grease zerk & install the brass "T" in its place.
- Insert the probe through the compression fitting so it touches the race of the bearing and then pull back 1/8" so it is not in contact with the race.
- Tighten the compression fitting to hold the probe in place.
- Reinstall the grease zerk into the brass "T" fitting and grease bearing to check for leaks.

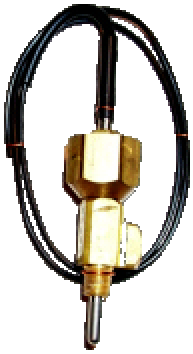
> *IMPORTANT: If a grease leak occurs, tighten the necessary fitting. Make sure the bearing is getting ample amounts of grease or lubrication.*



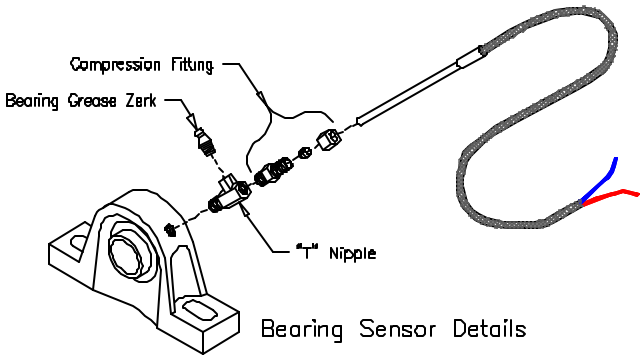
BPS-8



BPS-10



BPS-CON



Bearing Sensor Details

9.0 Conduit

Conduit is used to protect wires from weather or mechanical damage. Thin wall conduit is usually used for inside runs, which will not be exposed to the weather. Rigid conduit must be used for any outside work will be exposed to the weather, and may be required on some installation for inside runs as well. Follow any and all electrical code.

9.1 Selecting Size of Conduit

Conduit size is regulated by the mass of wires being housed. The maximum should be 40% filled. Proper type and size of fittings must be used in each raceway for ease in pulling wires.

The maximum number of leadwires, which must run through it, and the size of the leadwire determine the conduit size.

9.2 Maximum Fill Of Various Conduit Sizes

		Max Leadwire per Conduit Size				Area in Square Inches
		6 T/C	12 T/C	18 T/C	21 T/C	
Conduit Size	½"	7	3	3	3	.12"
	¾"	12	5	5	5	.21"
	1"	20	8	8	8	.34"
	1 ¼"	36	15	14	14	.60"
	1 ½"	49	20	19	19	.82"
	2"	81	33	31	31	1.34"

9.3 Conduit Requirements

Installing conduit runs must be kept away from high-voltage wires as much as possible to prevent any inductance "pick-up".

No more than two 90-degree beds or combination of bends totaling 180 degrees should be in the raceway between pull boxes.

Requirements regarding perpendiculars, horizontal, supports, fittings, and "expansion joints" are the same as for general electrical work.

When conduit is exposed to weather, joint compound and proper gaskets must be used; special precautions should be taken to keep moisture out of the conduit, so control wire and/or leadwire are kept dry.

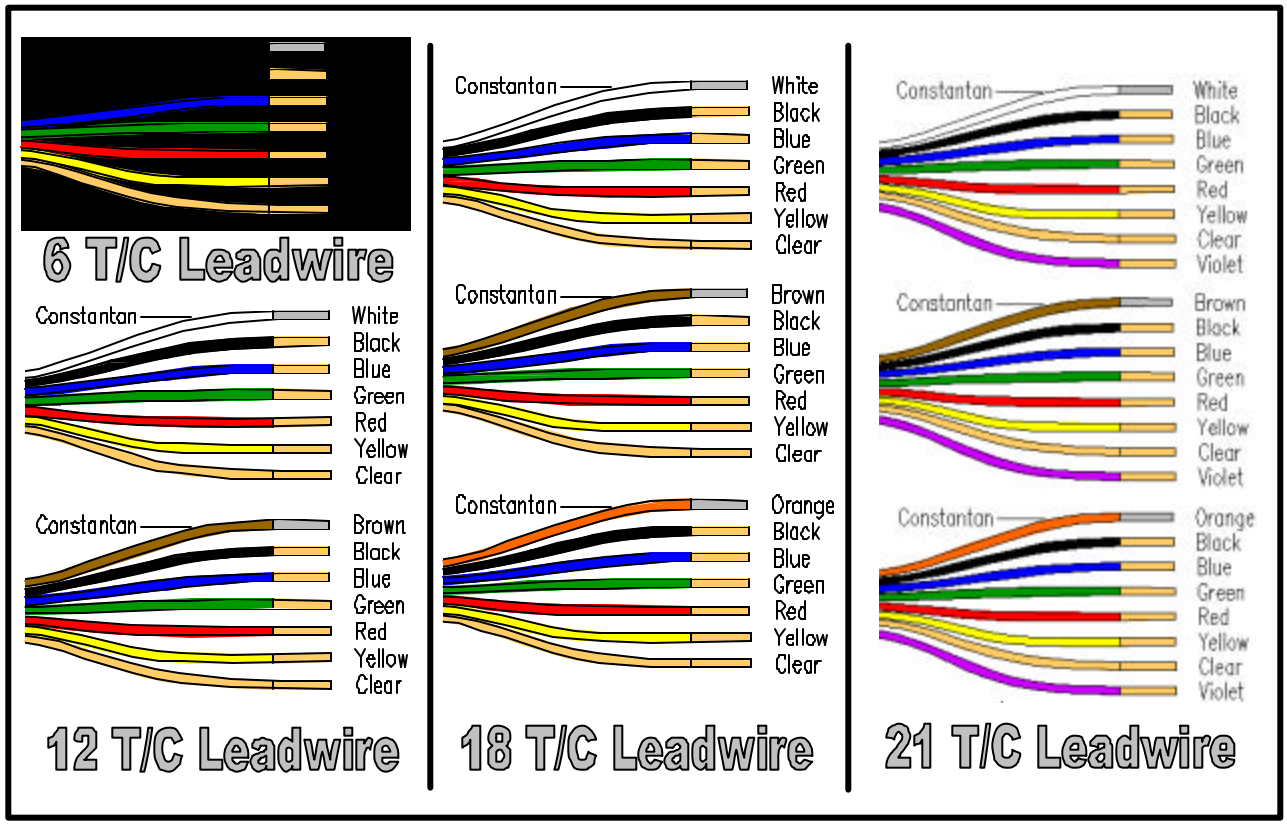
NOTE: Use of conduit is highly recommended, but not required for proper function of the instrument. HOWEVER, with that in mind, make all leadwire runs well clear of power lines to prevent any interference. DO NOT run leadwire in power trays or in conduit with any other lines either power or signal. With the use of dedicated conduit, all cabling is protected against damage and improper equipment shutdown.

10.0 Leadwire

All Rolfes Company leadwire is non-hygroscopic, UV stabilized, which will maintain signal integrity even in severe moist conditions to the sunniest, driest conditions.

The unique manufacturing process that Rolfes uses on its cables and leadwire begins by extruding color-coded polymer insulation over pure electrolytic 26 AWG solid copper and graded constantan conductors. The insulation thickness and integrity are electronically monitored throughout the process.

Instead of having many individual wires throughout the system, leadwire is used in various sizes to make this more manageable. Available in sizes from 6, 12, 18 and 21 T/C, each of these are capable of producing the number of T/C's labeled on them. Each of these different sized leadwires has a constantan group or groups of wires ranging from white, brown and/or orange. Each group has 6 wires to it: black, blue, green, red, yellow and clear (21 T/C leadwire has 7 wires to a group which has an added violet after the clear).



10.1 Rolfes Leadwire Availability

The Rolfes Company offers leadwire in cut-to-length or bulk quantities for the following varieties:

		UN-Shielded	Shielded	Constantans		
LEADWIRE	6 T/C	X		White		
	12 T/C	X		White	Brown	
	18 T/C	X		White	Brown	Orange
	21 T/C	X	X	White	Brown	Orange

10.2 Leadwire Installation

To help prevent leadwire problems, we recommend that all leadwire exposed to the outside environment be installed in an IMC or rigid threaded conduit. Do not use aluminum conduit. See the chart (page 22) for proper sizing of conduit for leadwires.

On installations without conduit, the leadwire should be attached to an existing conduit or messenger wire with tie bands. Avoid attaching to conduit where the voltage of the wires exceeds 500 volts. Attach the wire so it is protected from physical damage.

🏷 NOTE: Label both ends of every leadwire run to avoid any confusion.

10.3 Leadwire Splicing Instructions

For proper operations of this type of monitoring equipment, some sort of splicing will be a required step. Again keep in mind the less splices the better. Follow these steps for splicing leadwire together.

10.3.1 Tools required

Compression tool – Rolfes P/N SPL-HDT

Diagonal cutting pliers

Long nose pliers

Knife

10.3.2 Material required

Line “B” grease filled crimps – Rolfes P/N SPL-10

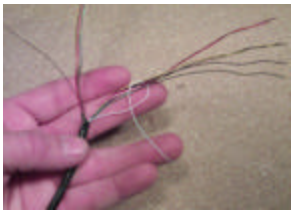
Electrical tape

🏷 *NOTE*: Identify the leadwires you wish to splice. Failure to do this will result in incorrect information at your instrument.

1. Locate the nylon ripcord “ridge” along the leadwire and using a sharp knife, cut along it for one inch exposing the ripcord.
2. Pull the ripcord with the long nose pliers, splitting the outer covering of the leadwire back approximately six inches. Cut off the outer covering.

🏷 *NOTE*: If the ripcord breaks, make a slit along the outer covering and open along the top of the ripcord ridge, use caution to not cut or “nick” the wires inside.

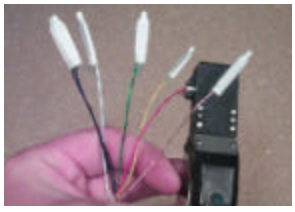
3. Untwist and/or separate the individual groups of wire and wrap the constantan wire (white, brown or orange) around that group. This will help to identify which group of wire you are working with.

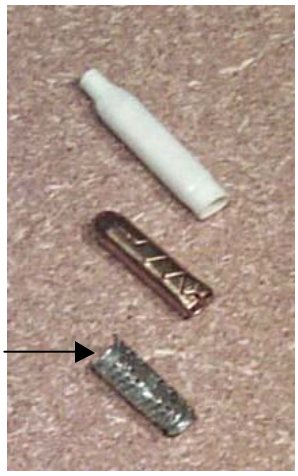


🏷 *NOTE*: Depending on which leadwire you are using will determine the color groups, see page 16 for leadwire information.

4. Repeat the 3 steps above for the second leadwire that will be spliced together.

5. Tape the two pieces of leadwire together approximately 2” back from where the outer insulation has been removed.
6. Separate the groups of each leadwire and match the groups that will be spliced together.





🏷 *NOTE*: If the leadwires are not being spliced color for color (i.e. black to black), in step 7, select the groups that will be connected and in step 9 select the individual wires that will be connected.

7. Select the 1st group of each leadwire and fold the remaining groups out of the way.
8. Separate the individual wires of the two groups.
9. Select any two wires that have the same color. (See note in step 6). Without removing the insulation, twist the ends tightly at least 8 half-turns (should be twisted for a length of approx. ¾”).
10. Repeat until all wires of the group from each leadwire are twisted, including the constantan wires.
11. Cut the twisted ends of all the wires and to approximately the same length.
12. Place the SPL-10 crimp over each pair of twisted wires. Be sure the wires are inserted into the crimp as far as possible.
13. Using the crimp tool, compress the crimp tightly. The tool is designed so that it will not open until the crimp has been fully compressed.

🏷 *NOTE*: Each crimp has several “teeth” inside and will make a good connection through the insulation of the individual wires, so it is not necessary to strip the insulation from the individual wires prior to crimping. See crimp components at right.

🏷 *NOTE*: Maximum of three (3) un-stripped wires per crimp.

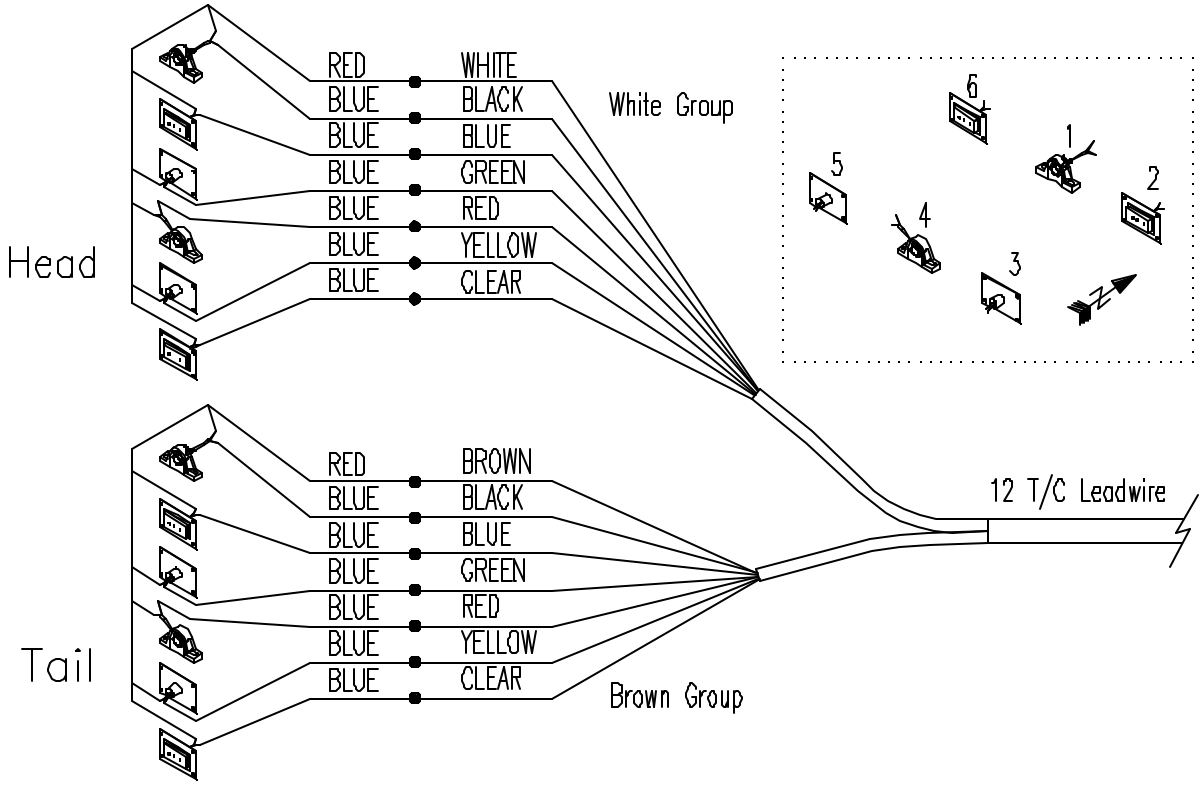
14. Repeat step 13 for all wires in that group.
15. Repeat steps 7 through 14 for the remaining groups.

10.4 Splicing in Equipment

Using the color code and the sensor layout, start by splicing the sensors in as seen below. Starting at the head section, make all splices to the leadwire running to that section. From there the leadwire will most likely continue to the tail section. There it will be spliced into a larger size leadwire going to the instrument. Keep in mind the shortest run to the instrument will have the larger leadwire. For this example: if there are 12 points to be monitored and the tail section is closest to the instrument, a 12 T/C leadwire from that point back will be installed. To join the two sections together, run a 6 T/C from the tail to the head.

For this example, you'll splice in a 6 T/C leadwire from head section into a 12 T/C leadwire. The 6 T/C leadwire has a WHITE group only and the 12 T/C leadwire will have a WHITE group along with a BROWN group. Since you wired in all 6 sensors at the head section, splice that 6 T/C leadwire into the WHITE group of the 12 T/C leadwire, with everything being color to color (less confusion and/or color transposing). Next, splice in the tail section's 6 T/C leadwire into the BROWN section of the 12 T/C leadwire. Try to stay consistent, as an example if the black wire of the head section is the north bearing, do the same for the tail section.

If you have multiple sensors in one location, you can make all common connections (constantans) in one splice. For instance, you might have 2 probe sensors and 4 rub sensors at the tail of a leg. Connect all of the sensor constantan wires to the leadwire constantan.



NOTE: When making a splice with more than 3 wires in a type "B" connector, strip back the ends and twist the wires together prior to crimping.

11.0 Additional Equipment

When splicing in additional equipment it may be necessary to transpose wire colors. BUT, do this ONLY on the PIGTAIL at the MUX.

With the addition of another "leg" (for example) the wiring process up to the MUX, should be wired the same as "leg #1". If done correctly, you know that the BLACK wire of the WHITE group (12 T/C leadwire) is the north bearing of the head section. This will help you to keep things in logical order of which items are what and the order they are scanned.

11.1 Splicing Leadwires At The Multiplexer

Refer to the cross-reference sheet for sensor number and equipment description. If you have not completed a cross-reference sheet, it must be done at this time. (See Bearing and Rub Configuration Worksheet). All leadwire coming into the Multiplexer should be labeled and can be grouped together with the corresponding pigtail. Follow the color codes of the leadwires and pigtails.

NOTE: Not all splices will be spliced color for color. Follow the sensor number sequence for the color of the wire in the pigtail to match it to the color of wire in the leadwire.

11.2 Install Communication and Power Supply Cable

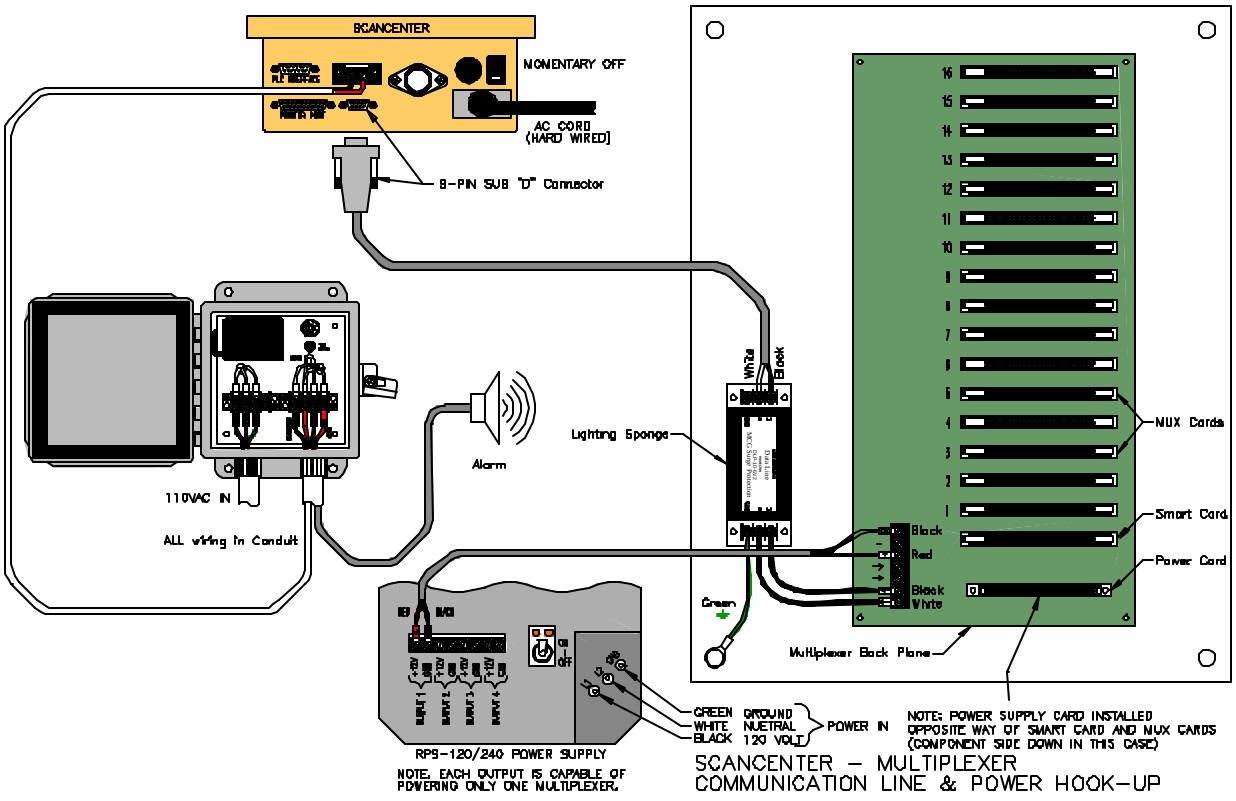
Communication cable and power supply wire must be installed in an IMC or rigid threaded conduit or in plastic pipe, but only when used as an aerial (page 22). Communication cable is connected in parallel from the ***SCANCENTER*** and from MUX to MUX. Therefore, it can be spliced in the middle of two or three Multiplexers and branched off in each direction. One power supply cable is required for each Multiplexer. Since the UL listed power supply can handle up to four Multiplexers, it's possible to have four power supply cables in one area of the conduit. See drawing on page 28 for proper connections to the Multiplexers. Connect the communications line to the backplane coming from the ***SCANCENTER***.

11.2.1 Connect Power

Connect AC Power to the Remote Power Supply. A licensed electrician must do this. Verify the proper Operation of LED's on the Smart Card. (See Smart Card description, page 11.)

11.3 Verify Points

After everything is connected turn on the ***SCANCENTER*** and observe the temperatures, looking for opens indicated by "255" in the display. Note the temperatures. Make sure your temperatures are believable. Temperatures in the boot area of a leg will generally be very consistent if the leg hasn't been running for a while. Likewise, head temperatures will be warmer if the heads are exposed to the sun.



12.0 Instrumentation & Controls

The ***SCANCENTER*** *Series* uses a bold face LED style display with the controls located just below. Once the ***SCANCENTER*** is setup for operation, no other adjustment should be needed. Set it once and let the system alert the operators of any problems and where to take the appropriate action.

12.1 As a Stand Alone Unit

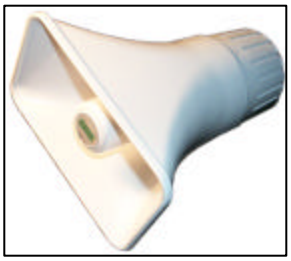
The display on the ***SCANCENTER*** will reference a MUX number and a sensor number. A cross-reference sheet listing the equipment and sensor location of the MUX and sensor number must be completed. The sensor numbers are in sequential order 1 through 147 for a MUX 7 & 1 through 336 for a MUX 16 (each pigtail has 21 sensors). For ease of connecting and troubleshooting, avoid connecting sensors from one piece of equipment on two separate pigtails whenever possible. This may result in unused sensor locations (out of the 21) on the pigtail. These can be connected as ambient sensors or programmed as inactive at the ***SCANCENTER***.

12.2 Computer Scancenter

Follow the same guidelines of the stand alone ***SCANCENTER*** for the computer version. Once the system is complete, send all pertinent information along with a detailed description or drawing of the type of equipment, so it can be programmed into the graphics software.

13.0 Alarm & Siren

The recommended alarm for the ***SCANCENTER*** system is the ALRM-100. This ALRM-100 is easily installed and should be mounted near the ***SCANCENTER*** with the SIREN mounted where it will be noticed or heard clearly by any operators.

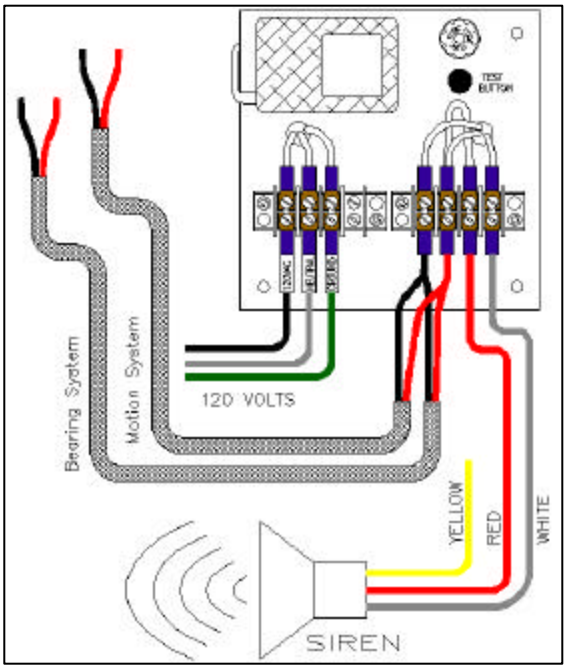


Dual-Tone Siren

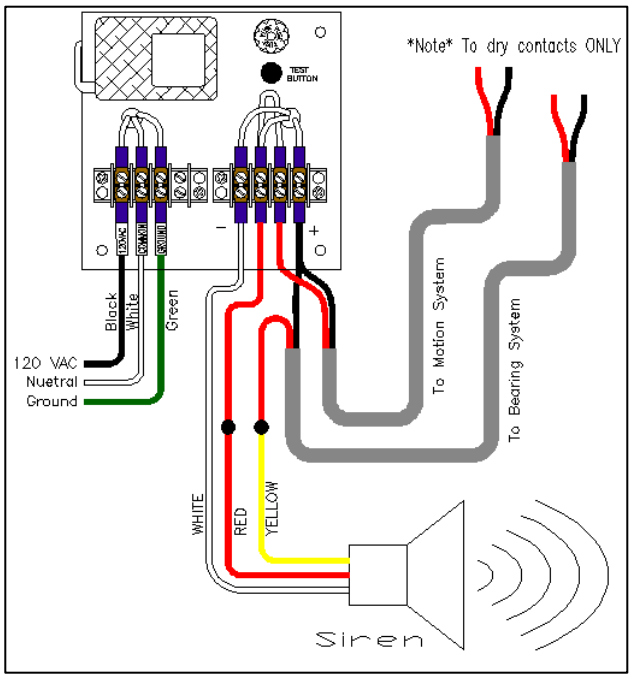
Use good judgment when locating an area for the SIREN; you don't want it to be too close to your operators, OR too far away from your operators to hear it over the noise of the equipment.

This diagram (right) shows two different monitoring systems and one ALRM-100 controller using the dual tone capability of the siren. (i.e. Motion system & Bearing system.)

The diagram below shows two identical systems using the same ALRM-100.



If your facility has multiple systems using the same ALRM-100 use this diagram.



Dual-Tone Systems w/ one ALRM-100

Siren Tones	
Yellow	**Solid**
Red	**Wave**
White	**Common**

- *NOTE:* If your facility has only one monitoring system, OMIT the "additional systems" lead in the diagram.
- *NOTE:* USE DRY CONTACTS ONLY (no voltage on lines going to or from these systems).
- *NOTE:* All electrical connections are to be made by a licensed electrician and in accordance with any local or regional electrical codes.

WARNING: The ALRM-100 is rated at 120VAC ONLY. If your facility requires 240VAC, install a 240VAC to 120VAC transformer / converter. Contact your sales representative if you require a transformer / converter.

14.0 Operations and Set-Up

Normal Modes Of Operation:

- Auto Scan
- Set Limit (as well as several service and diagnostic modes).
- Manual Scan

Use the Mode Key Is used to exit an operation and step to the next normal operating mode.

14.1 Power On Sequence

When the ***SCANCENTER*** is first turned on, several things are accomplished in rapid succession.

- The alarm relay is closed momentarily to check its operation.
- The configuration information stored in RAM is checked to ensure the values are reasonable.
- If the values in RAM are not reasonable, the program jumps to the configuration menu.
- If the values in RAM are reasonable and no POWER-UP KEYS are pressed, the program goes to Auto Scan mode.

14.2 Power Up Keys

Several power-on key modes may be invoked by pressing a key as power is applied.

As the power is turned on, the display clears, the alarm relay closes momentarily, and the software name is indicated on the display.

As the version number appears, momentarily press and release the appropriate function key and the Scancenter will enter the selected mode. (SEE BELOW)

When Version Number is Shown Momentarily Press And Release	Scancenter Will Invoke the Following Modes
* Key	Timing Setup Mode
Print Key	Configuration Print Out Mode
# Key	Configuration Mode
9 Key	Change The Temperature Display To C°
6 Key	Change The Temperature Display To F°
7 Key (Ambient ONLY)	Configuration Download
0 key	Re-Set All Sensors To Group 1
ⓘ ≥IMPORTANT≤ If you change from F° to C° or vise-versa, reset all of the setpoints to its equivalent temperature.	

14.2.1 Setting Time And Date

At Power-up, (see above) then press and release the ∗ (star) key.

- The Scancenter will display MM/DD/YY and 00:00 (time).
- Use cursor key to move through selections.
- Press appropriate key to set correct value.
- Press mode key to return to Auto Mode.

14.2.2 System Configuration Print-Out

At Power-up, (see power up keys) then press and release the PRINT key.

Printout will show the following.

Hot Spot Bearing Configuration Printout 26 Oct 02 2:30 PM

Mux # (1) 1
Sensors 109

Group	1	2	3	4	5	6	7	8	9	10
Warning	140	50	117	58	37	48	50	117	0	255
Alarm	150	140	150	160	170	180	190	200	210	255

Mux # 1 Card # 1

Sensor #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Equip.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

POWER ON PRINT KEY PRINT-OUT

14.3 Configuration Mode

Once the sensors are in a known state, they may be programmed as desired by entering into the set-up mode. At Power-up, (see power up keys) then press and release the # key.

14.3.1 Press 1 to Configure system.

- ***SCANCENTER*** will display the # of MUXs in system on the top line.
- Use the cursor to move through selection.
- Press appropriate key to set correct values for your system.
- Bottom line displays MUX # and number of sensors.
- Use cursor to move through selection.
- Press appropriate key to set correct values for your system.
- Press Mode key twice to return to Auto Mode.

14.3.2 Press 2 to assign sensors to equipment.

The equipment number is used to locking out a defective sensor, disable any sensors that are not wired in or are not used.

NOTE: If defective sensor, this should ONLY be used as a TEMPORARY MEASURE! Repair the sensor problem as soon as possible.

If the equipment number is set to 0, the program will not monitor the sensor and will not allow any of the normal program functions such as manual scan or assign alarm/warning group to be preformed for that sensor.

If the Bearing ***SCANCENTER*** is connected a PLC Interface and an alarm or warning condition occurs, the program outputs the equipment number to the PLC interface along with an alarm or warning bit.

If the system will be using the equipment number to disable a sensor or to communicate alarms and warnings for a particular piece of equipment via the PLC interface, the equipment number should be set third.

Press the Mode key to exit Setup Mode and step to the next normal operating mode.

14.3.3 Auto Mode:

DO THIS:	NOTE THIS:
Power On	*SCANCENTER* has print option, You are asked if you want to print or not.
Press Print if you want a log, (ensure printer is powered on)	Printing, then *SCANCENTER* will continuously read all sensors in the system.
Or Enter if you do not want to print.	*SCANCENTER* will continuously read all sensors in the system.
Press the Mode Key to exit.	Auto Mode

14.3.4 Manual Mode:

DO THIS:	NOTE THIS:
Press Mode key on front panel until Manual mode is displayed (momentarily)	Flashing cursor in display
Press cursor to move to Sensor #, Change value to sensor #, press ENTER to read or step through sensors.	Temperature of sensor(s)
Press the Mode Key to exit.	If no key is pressed in 5 minutes the *SCANCENTER* will automatically change to Auto Scan Mode and continuously read all sensors in the system.

Below is an example of the ***SCANCENTER'S*** normal PRINT mode***.***

Hot Spot Alarm Scan 26 Oct 02 2:28 PM

Group	1	2	3	4	5	6	7	8	9	10
Warning	140	50	117	58	37	48	50	117	0	255
Alarm	150	140	150	160	170	180	190	200	210	255

	MUX #	Sensor #	Equipment #	Group #	Temperature	Date	Time
ALARM	1	211	1	1	195	26 OCT 02	2:28 PM
ALARM	2	120	4	1	255	26 OCT 02	2:29 PM

AUTO MODE PRINT-OUT

14.4 Ambient Option

The ***SCANCENTER*** Bearing system with ambient compensation V11 software provides the ability to specify an ambient MUX and sensor, ambient alarm limit, absolute alarm limit, and equipment number for each sensor in the system. These settings are used in the Auto Mode to determine and communicate alarm conditions.

The ambient MUX and sensor are used to specify which sensor in the system is to be used to compare against the temperature of the monitored point. Setting the ambient MUX and sensor to zero (0), disables ambient comparisons for that point.

When the monitored point exceeds the absolute alarm limit, the alarm condition exists and will be printed, alarmed and sent to the PLC if the required conditions exist (print selected, printer connected, and ready, PLC interface connected, etc.)

When the monitored point exceeds its ambient sensor by the ambient alarm amount, the ambient alarm condition exists and will be printed, alarmed and if connected, sent to the PLC (print selected, printer connected, and ready).

The ***SCANCENTER*** also has an equipment number assigned to each sensor on each MUX. This number has a value from 0-63 is used to communicate which piece of equipment is having a problem to a PLC via a parallel interface. If a sensor is assigned to equipment number 0, the program assumes the sensor is not wired or is to be excluded from scanning for some hardware reason. Sensors assigned to equipment number 0 will show as disabled in manual and set limit modes and will show N/A on the configuration printout.

The ***SCANCENTER*** will monitor for absolute temperature of a sensor or the difference above an ambient temperature. Each sensor on each MUX may be assigned an alarm and ambient alarm limit. If a sensor is not available for some hardware reason, such as no sensor connection, the equipment number should be set to zero.

When the ***SCANCENTER*** is in Auto Scan Mode, this equipment number will be sent to the PLC interface along with a “bit” to indicate an *ambient* or *absolute* alarm when the temperature of any sensor assigned to that piece of equipment is above the alarm setpoints. An alarm contact should be connected to a siren to alert the operator of this condition, which will require attention.

The ***SCANCENTER*** may be connected to a serial printer via a 25-pin RS-232 port. A 15-pin parallel output may be connected to a PLC interface.

14.5 Auto Mode (Ambient Option)

At power on, if no power-on key is pressed, the ***SCANCENTER*** goes to Auto Mode and waits for the operator to choose PRINT to print alarms or ENTER for display only. If at any time the ***SCANCENTER*** is not in the Auto Mode OR is left with no operator action taking place, the unit reverts back to Auto Mode and PRINT selected within a few minutes of time.

In Auto Mode, all sensors in the system which have not been set to equipment zero are scanned. The display will show “AUTO SCAN” or “FULL SCAN OF SYSTEM COMPLETE”. Sensors are continuously scanned until the mode is changed or power is removed from the ***SCANCENTER***. If a temperature is detected that is above the ambient alarm value set for the sensor AMBIENT is displayed along with the normal data, the alarm output relay contact is closed for four seconds. If there is a printer connected and the Print Mode has been selected, a report of the alarm will be printed.

If a temperature is detected that is above the alarm value set for the sensor, ALARM is displayed along with the normal data, the alarm output relay contact is closed for approximately eight seconds. If there is a printer connected and the Print Mode has been selected, a report of the alarm will be printed.

If connected to optional PLC Interface, the equipment number and alarm bit is set.

The print option allows all sensor temperatures or alarm temperatures to be sent to a printer for hardcopy report.

Hot Spot Alarm Scan 17 Dec 02 6:05 AM

	Mux #	Sensor #	Equip #	Amb Mux	Amb Sensor	Amb Temp	Amb Limit	Alarm Limit	Temp	Date	Time
ALARM	1	1	1	1	1	71	45	140	171	17 Dec 02	6:05 AM
ALARM	1	2	1	1	1	71	45	140	175	17 Dec 02	6:06 AM
ALARM	1	3	1	1	1	71	45	140	179	17 Dec 02	6:06 AM
ALARM	1	4	1	1	1	71	45	140	183	17 Dec 02	6:06 AM
ALARM	1	5	1	1	1	71	45	140	189	17 Dec 02	6:06 AM

AUTO MODE PRINT-OUT

14.5.1 System Configuration Print-Out (Ambient Option)

Hot Spot Bearing Configuration Printout 17 Dec 02 6:06 AM

Mux # (1) 1
Sensors 336

Mux # 1 Card # 1

Sensor #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Equip. #	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Amb Mux	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ASensor	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Amb Alm	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Alarm	170	170	170	170	170	170	170	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Temp.	65	70	75	80	85	90	96	102	107	112	117	122	127	132	138	143	148	143	158	163	168

Mux # 1 Card # 2

Sensor #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Equip. #	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Amb Mux	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ASensor	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Amb Alm	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Alarm	150	150	150	150	150	150	150	160	160	160	160	160	160	160	160	160	160	160	160	160	160
Temp.	81	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255

POWER ON PRINT KEY PRINT-OUT

14.5.2 Auto Mode: (Ambient Option)

DO THIS:	NOTE THIS:
Power On	*SCANCENTER* has print option, You are asked if you want to print or not.
Press Print if you want to print, (ensure printer is powered on)	Printing, then *SCANCENTER* will continuously read all sensors in the system.
Or Enter if you do not want to print.	*SCANCENTER* will continuously read all sensors in the system.
Press the Mode Key to exit.	Auto Mode

14.5.3 Set Limits Mode: (Ambient Option)

DO THIS:	NOTE THIS:
Power On	*SCANCENTER* has print option, You are asked if you want to print or not.
Press Mode Key	(Sensor) MUX # 1 Sensor # 1 Alarm 0°F Ambient: MUX # 1 Sensor # 1 Alarm 0°F
Press Cursor to move through selections.	Top line Sensor Bottom line Ambient
Enter Values	Note change
Press Mode Key twice	Enter AUTO MODE

14.5.4 Manual Mode: (Ambient Option)

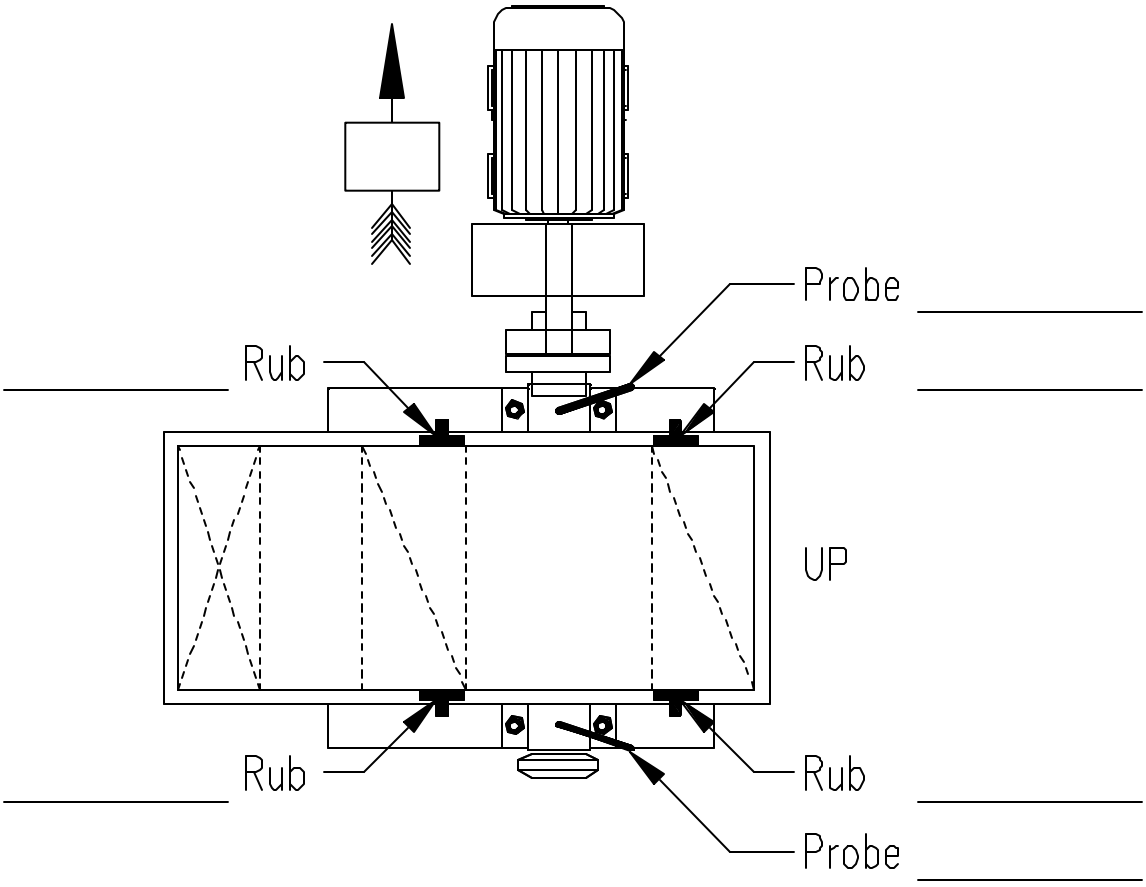
DO THIS:	NOTE THIS:
Press Mode key on front panel until Manual mode is displayed (momentarily)	Flashing cursor in display
Press cursor to move to Sensor #, Change value to sensor #, press ENTER to read or step through sensors.	Temperature of sensor(s)
Press the Mode Key to exit.	If no key is pressed within 5 minutes, the *SCANCENTER* will automatically change to Auto Scan Mode and continuously read all sensors in the system.

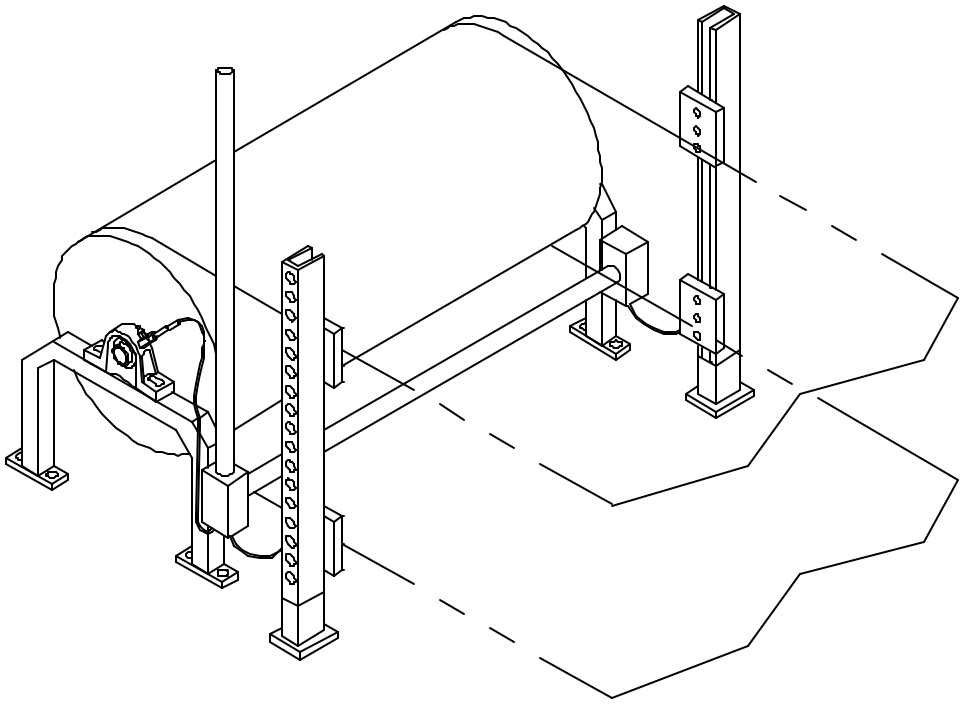
15.0 Freeze Mist Test

The Freeze Mist test was developed to verify the function and location of each sensor after the installation is completed. Items inspected during the visit include; proper sensor location, hardware used, slices in junction boxes and at the instrument, test of audible alarms / horns, freeze mist, and custom printout of sensor locations along with verification of items checked. Call the service department to schedule this test.

Appendix 1

Sensor Layout Worksheet:





Appendix 2

Average Wire Types and Sizes:

Wire Types	Area in Square Inches	Max. Diameter
THHN #18 AWG	.0069	.094
THHN #16 AWG	.0086	.105
THHN #14 AWG	.0106	.116
THHN #12 AWG	.0143	.135
Duplex Wire	.0201	.160
20 Pair Copper	.0824	.324
Power Supply Cable	.0452	.240
Communication Cable	.0483	.248
Alarm Wire	.0167	.146
6 T/C	.0165	.145
12 T/C	.0401	.226
18 T/C	.0434	.235
21 T/C	.0471	.245
Motion Sensor Cable	.0452	.240
Cel-Tek Coax	.0280	.1875
Cel-Tek Belden	.0620	.280

MUX Pigtail Pin Assignments

Pin Number On Pigtail	**Wire Color Code Group/Wire Color**	**Pin Number On Pigtail**	**Wire Color Code** Group/Wire Color
1	White / Black	13	White / Blue
2	White / Green	14	White / Red
3	White / Yellow	15	White / Clear
4	White / Violet	16	Brown / Black
5	Brown / Blue	17	Brown / Green
6	Brown / Red	18	Brown / Yellow
7	Brown / Clear	19	Brown / Violet
8	Orange / Black	20	Orange / Blue
9	Orange / Green	21	Orange / Red
10	Orange / Yellow	22	Orange / Clear
11	Orange / Violet	23	Brown Constantan
12	White Constantan	24	Orange Constantan

Appendix 3

Bearing and Rub Configuration Worksheet

MUX # _____ CARD #_____ PIGTAIL #_____

SENSOR DESCRIPTION	*SENSOR #*	*MUX PIGTAIL*	*FIELD COLOR*	*LEADWIRE NUMBER*	*Ops ✓*
Equipment – *USE WHITEOUT IN THE ARES ON THIS EXAMPLE SHEET AS NESSECARY AND COPY*					
North Bearing	1	**White / Black**			
Northeast Rub	2	**White / Blue**			
Southeast Rub	3	**White / Green**			
South Bearing	4	**White / Red**			
Southwest Rub	5	**White / Yellow**			
Southeast Rub	6	**White / Clear**			
Ambient	7	**White / Violet**			
Equipment -					
	8	**Brown / Black**			
	9	**Brown / Blue**			
	10	**Brown / Green**			
	11	**Brown / Red**			
	12	**Brown / Yellow**			
	13	**Brown / Clear**			
--	14	**Brown / Violet**	--	--	--
Equipment -					
	15	**Orange / Black**			
	16	**Orange / Blue**			
	17	**Orange / Green**			
	18	**Orange / Red**			
	19	**Orange / Yellow**			
	20	**Orange / Clear**			
--	21	**Orange / Violet**	--	--	--

Appendix 4 - Instructions For Changing EPROMS

The ***SCANCENTER*** has two EPROM memory chips - one for the system configuration and one for the program. This procedure is used for changing either or both of these EPROMS.

Requirement Tools

- Small Phillips screwdriver
- Small to medium sized blade screwdriver
- Very small blade screwdriver with blade of about 1/8" to 3/16" wide
- Padded Surface (Working area).

PROCEDURE

- Turn power off, then remove all cables and lead wires attached to the rear panel.
- Set the ***SCANCENTER*** face down on a padded surface so as not to damage the keyboard or scratch the display lens.
- Remove the 4 screws that hold the base assembly to the cover assembly. - See Fig. 1.

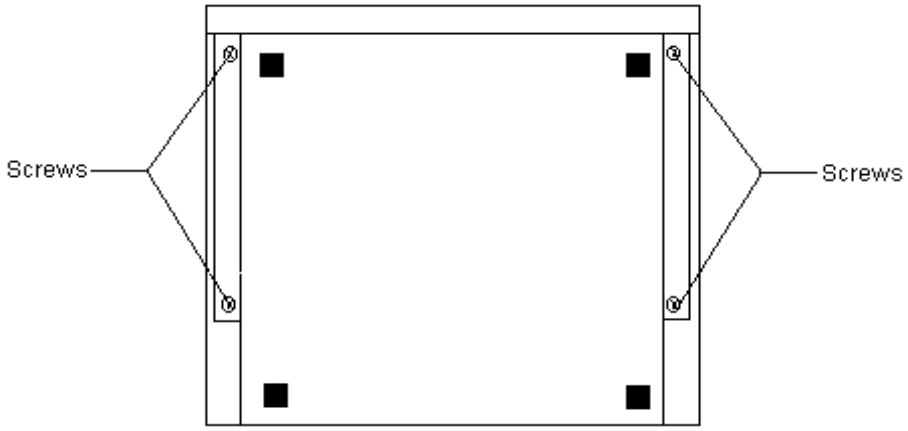


Figure 1

- Pick up the ***SCANCENTER*** by the cover while holding the base to the cover with your fingers. Turn the ***SCANCENTER*** right side up and set it down with the keyboard facing you - while holding the two parts together
- With your hands/fingers on each side of the top lift it up about 1" and tip it to the right to a vertical position and set the cover on its right edge right next to the right side of the base - see fig. 2. This is done in this manner to prevent disconnecting or pulling on the two cables that interconnect the two parts. Prevent the top from falling over by holding it upright with your right hand - or have someone else hold it. DO NOT disconnect either of the two cables and DO NOT try to lay the cover down.

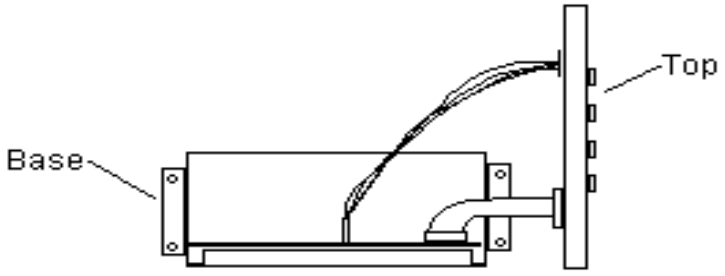


Figure 2

- See figure 3 for location and directional positioning of the EPROMS. Note that there is a small notch at the narrow end of these "chips" and that this notch is at the end of the chip closest to the front of the instrument.

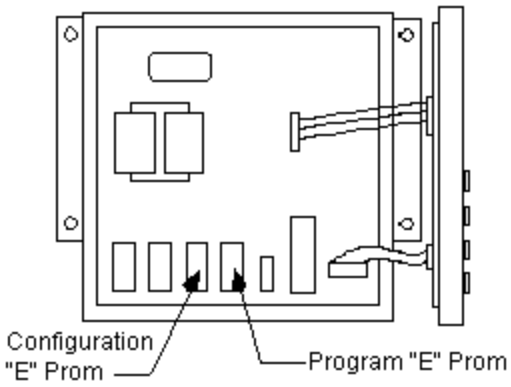


Figure 3

- Gently slide a small bladed screwdriver between the chip and its mounting socket. Be careful not to wedge against the small yellow capacitor that is at this end of the chip.
- Gently pry up on the chip a little at a time, move the screwdriver forward and gently pry up more until the blade tip reaches the other end of the chip. While doing this, try not to tip the chip front to rear by more than about 15 deg. Now twist and tip the screwdriver to loosen the chip in its socket. Remove the screwdriver and gently lift the EPROM from its socket and set it aside. See Fig. 4.

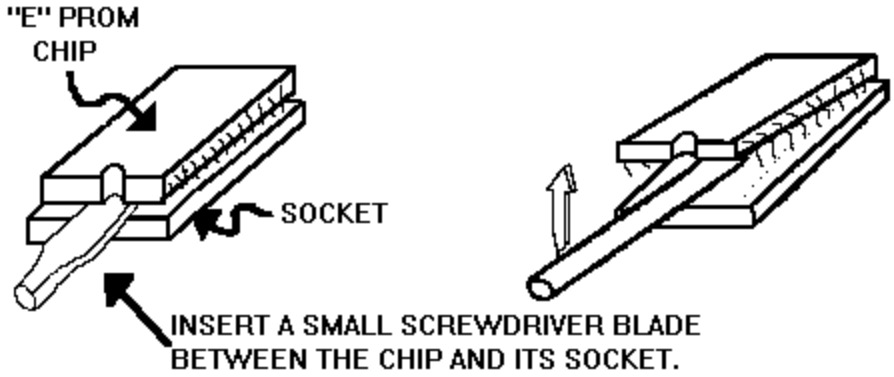


Figure 4

- Replacing with the new EPROM. Pick it up with your thumb on the notched end and your middle finger on the other end. Align the chip over the socket and gently set the left row of pins into the socket.
- Now work the right side pins into the socket. You may have to apply a slight amount of sideways pressure with your index finger in order to get these pins to drop into the socket properly. Carefully, using a "wiggling" effect, press the EPROM into the socket making certain that none of the chip leads gets bent.
- Press it firmly into place. See Fig. 5.

Figure 5

- Check to see that all pins are in the socket and that the notched end is towards the front.
- Set the cover back onto the base making sure that the "lip" on the front of the base is inside the cover.
- While holding the cover in place, turn the ***SCANCENTER*** over and once again place it face down on the padded surface.
- Install the 4 assembly screws. - Turn it over, re-connect the cables and put the unit back into service.

Appendix 5 - Problem Solving Procedures

If you encounter a system error, write down any information appearing on the screen along with any keystrokes that you entered before you encountered the error.

Try to reset the system by turning the ***SCANCENTER*** off and then turn it back on after a few seconds.

If you received an error message saying the ***SCANCENTER*** is not hooked up or communicating with the computer, check the following connections to be sure the system is still connected properly.

- Verify power to the unit.
- Verify cable connections are secure.
- Verify the ***SCANCENTER*** is connected to the correct serial port on computer.

If your ***SCANCENTER*** is properly connected and you cannot run the ***SCANCENTER*** software, and you have no other software programs currently running, try restarting your computer.

Follow the STANDARD START-UP PROCEDURE to run the system.

If none of the above procedures will allow you to run the system, or you have received another error, you may need to re-install the software from the original installation disks.

PLEASE call The Rolfes Company at 1-800-824-7274 prior to doing this and give us the above information.

Appendix 6 - Troubleshooting Guide

Multiplexers do not answer to the ***SCANCENTER***:

- Possible Causes:
- ***SCANCENTER***
- Smart Card
- Power Supply Card
- Power Supply
- Power Supply Wire
- Communication Wire
- MUX Rack

Procedure:

1. Using a voltmeter, measure the voltage at the MUX. Check for 12 volts DC, coming in from the remote power supply to the back plane at the Multiplexer.

   NOTE: The MUX will not operate below nine (9) Volts DC.
2. If there's not 12 VDC at the MUX, perform the next steps.
   a) Measure for +12 VDC at the power supply using a voltmeter.
   b) If there is NOT 12 VDC at the power supply, check AC supply to power supply. There should be a minimum 110 Volts AC to the power supply.
   c) If there is 110 VAC, check fuse. If the fuse is OK, the power supply is defective.
   d) If there is not 110 Volts AC, check circuit breaker and the wiring.
   e) If there is 12 VDC at the power supply, check the wires between the power supply and the MUX.
      i) Disconnect the wires at the power supply and tie together.
      ii) Go to the MUX, ohm through the power supply wires to verify continuity and check for grounds.
      iii) If there is NOT continuity, replace wire.
      iv) If there is continuity, check for grounds and shorts between conductors.
3. If there are 12 VDC at the MUX: (Verify 5 VDC on the Smart Card).

   NOTE: New style Smart Cards has LEDs, which show this #4 (+5 Volts) and #5 (-5 Volts).
   a) If the MUX's Does Not Answer:
      i) Disconnect communication wires at the ***SCANCENTER*** and tie together.
      ii) Go to the MUX; disconnect communication wires, ohm through the COM wires for continuity using an ohmmeter.
      iii) Using the ohmmeter, measure from one COM wire to ground.
         (1) If there is continuity, replace the wires.
         (2) If there is no continuity, reconnect wires at MUX and ***SCANCENTER***.
   b) If all the above steps have been performed and the MUX's still do not answer:
      i) Try to get only one MUX to answer rather than the entire system. One defective Smart Card can cause the entire system to not communicate.
         (1) Disconnect all MUX's except one.

(2) If that MUX does not answer; replace the Smart Card.

(a) Disconnect power (12 VDC) before removing the Smart Card from rack by turning off the remote power supply or by pulling the power supply card out of the MUX Rack..

(3) Verify switch settings and set on the NEW Smart Card before installing.

(a) The switch settings must be changed prior to inserting the Smart Card.

(4) If the MUX still does not answer, replace ***SCANCENTER***.

4. Only One Multiplexer Does Not Answer:

(Follow previous steps. Verify and correct the Voltages.)

a) If all Voltages are OK then:

i) Verify good wire connections for the communication wire on the back-plane terminal block.

ii) By-pass the lightning sponge (if there is one in-line) in the Multiplexer.

iii) Replace the Smart Card. Follow the above mentioned steps for replacing the Smart Card.

5. A Multiplexer Is Reading Incorrect Temperatures:

a) The entire Multiplexer is reading open Thermocouples.

i) Check + and - power supply Voltages.

ii) Check to see if the constantan wire on the Smart Card is disconnected from the constantan wire on the MUX card.

iii) Pull the power supply card out.

iv) Pull the Smart Card out and clean the gold contacts on each.

v) Re-insert the Smart Card.

vi) Reconnect the pigtail wire with the wire on the main buss board.

vii) Re-insert the power supply card, component side opposite way of Smart Card and MUX Cards.

b) The Multiplexer is reading all zeros.

i) This is a sign of a shorted sensor to ground somewhere in the system.

NOTE: A shorted sensor can either pull a group of sensors to zero, a Multiplexer card to zero or the whole Multiplexer to zero. The following steps will guide you in troubleshooting your system. In rare circumstances, a shorted sensor may cause the temperatures to increase.

c) Pull pigtail off of MUX card.

d) Set Ohmmeter on a scale greater than 10 Meg Ω.

e) Place black lead (of the meter) on earth ground, and red lead on pins 12, 23, and 24 of the pigtail. Continuity should be infinite (no readings on meter). If not check for grounded leadwire or sensor. Pins 1, 12, 13 and 24 are labeled inside the connector housing near the pins.

f) To verify that the sensor is bad

i) First disconnect the sensor at its location. (Ensure both copper and constantan wires are disconnected.)

ii) Check both copper and constantan wires to ground, should be infinite (no readings on meter).

iii) If all sensors ohm out correctly, leave them disconnected and check leadwire to ground.

NOTE: This process can be simplified with a MUX tester, contact Rolfes for info.

6. When A Sensor Pigtail Is Plugged In, It Changes The Readings Of The Other Sensors.
   a) This is a sign of noise. First check the condition of the lead-in-wire. If it appears to be bad, replace it.
   b) Check the cable for damage. Replace if necessary.
7. Freeze Mist / Point Verification.
   a) Locate sensor (point) per the configuration sheet.
   b) Remove sensor and spray with freeze mist.
   c) Verify sensor location with temperature change at Scancenter.

Note: After Correcting Any Problem With The Ambient Option, You Must Reset Sensors To Back Their Proper Parameters.

Limited Warranty

THE ROLFES COMPANY warrants that the products furnished to the PURCHASER will, at the time of shipment, be free from all defects in material and workmanship under normal use and service for a period of twelve (12) months from date of original shipment or, if installed by THE ROLFES COMPANY personnel, twelve (12) months from date of placing product into service. THE ROLFES COMPANY'S sole obligation hereunder shall be limited to, at THE ROLFES COMPANY'S option, either replacing or repairing any product for which (i) prompt notice has been given to THE ROLFES COMPANY within the warranty period of the product under question; and (ii) after THE ROLFES COMPANY'S authorization, is returned to THE ROLFES COMPANY'S factory of origin, freight prepaid; and (iii) after examination it is disclosed, to THE ROLFES COMPANY'S satisfaction, the product is defective.

If the product was originally installed by THE ROLFES COMPANY personnel within the continental United States, an on-site examination by THE ROLFES COMPANY can be performed in lieu of parts (ii) and (iii) above and if the product is found defective, it will be repaired or replaced under warranty if all other conditions of this warranty are met. If on-site examination is requested and no defects are found within the scope of this warranty, PURCHASER will be subject to payment to THE ROLFES COMPANY for the on-site examination at THE ROLFES COMPANY'S standard hourly and travel rates.

Any repair or replacement shall not extend the period with which this warranty can be asserted. All replaced equipment or parts will become the property of THE ROLFES COMPANY. This warranty shall not apply to products which THE ROLFES COMPANY has determined have, by PURCHASER or another, been altered or modified by anyone other than THE ROLFES COMPANY; or has been subjected to misuse, neglect, accident, damage in transit, abuse or unusual or natural hazard; or has been installed improperly or used in violation of THE ROLFES COMPANY'S standards and specifications.

THIS WARRANTY MAY BE ASSERTED BY PURCHASER ONLY AND NOT BY PURCHASER'S CUSTOMER AND IS EXPRESSED IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE ROLFES COMPANY'S PART. THE ROLFES COMPANY NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR THE ROLFES COMPANY ANY OTHER LIABILITIES IN CONNECTION WITH THE SALE OF SAID PRODUCTS. IN NO EVENT SHALL THE ROLFES COMPANY BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES; LOSSES OR EXPENSES INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, LOSS OF PROFITS OR LOSS OF DATA; OR FOR LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE FAILURE OF THE PRODUCT TO OPERATE PROPERLY OR THE INABILITY OF THE PURCHASER, PURCHASER'S CUSTOMER, OR ANY END USER TO USE THE PRODUCT EITHER SEPARATELY OR IN COMBINATION WITH ANY OTHER EQUIPMENT. In no event shall THE ROLFES COMPANY'S liability for failure to deliver or breach of any provision of this warranty, including, without limitation, THE ROLFES COMPANY'S obligation with respect to non-conforming items, exceed, with respect to the product, the purchase price of the relevant product.

THE ROLFES COMPANY reserves the right to incorporate improvements without notice and is not obligated to incorporate the same improvements in products previously manufactured.